CLAIMS

1. Method of carrying out a three phase chemical reaction under pressure that involves a gas phase and two non-gaseous phases, at least one of which is liquid, said method comprising the following steps :

circulating, in a closed loop and co-currently, two non-gaseous phases, in a reactor, by injection of the gas phase into the bottom of a central region of the reactor, in a way that creates an ascending circulation in said central region and a descending circulation in the annular region of the reactor, separated from the central region by a cylindrical partition ;

separation and recovery, in an upper region of the reactor, of the excess gas phase and a liquid fraction;

separate routing of the excess gas phase and the liquid fraction into a high pressure separator outside the reactor ; and

regulation of the pressure in the reactor and the level in the high pressure separator, by adjustment of a gas flow rate and a liquid flow rate leaving the high pressure separator.

2. Method according to Claim 1, in which the liquid fraction in said upper region is recovered through a lateral branch pipe positioned behind a profiled wall that inflects the circulation towards the annular region of the reactor and the liquid fraction is filtered at the inlet to said branch pipe.

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3. Method according to Claim 1, in which said gaseous and non gaseous phases are cooled inside the reactor.

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4. Method according to Claim 1, in which said gaseous and non gaseous phases are heated inside the reactor.

5. Method according to Claim 1, in which a reducing reaction is carried out on a liquid product under pressure using a gaseous reducing agent, in the presence of a solid catalyst.

6. Method according to Claim 5, in which the solid catalyst is periodically regenerated inside the reactor, by carrying out the following steps :

- discharge of the liquid phase;
- filling the reactor with water;
- sparging with an inert gas, for a specified time;
- emptying the water.

7. Method according to Claim 5, in which the reduction reaction carried out is the reduction of uranyl nitrate by hydrogen in the presence of platinum on a silica carrier.

8. Installation for carrying out a three phase chemical reaction under pressure, that involves a gaseous phase and two non-gaseous phases, at least one of which is liquid, said installation comprising :

- a reactor including a central region and an annular region, separated by a cylindrical partition,

means for injecting the gaseous phase into the bottom of the central region, to create closed loop and co-current circulation of the two non-gaseous phases, ascending in the central region and descending in the annular region ; said reactor further including an upper region for the separation and recovery of the excess gas phase and a liquid fraction ;

- a high pressure separator outside the reactor and connected to the upper region of the reactor, so as to separately route the excess gas phase and the liquid fraction into the separator ; and

- means of adjusting a gas flow rate and a liquid flow rate leaving the high pressure separator, so as to regulate the pressure in the reactor and the level in the high pressure separator.

9. Installation according to Claim 8, in which a lateral branch pipe for recovering the liquid fraction emerges into the upper region of the reactor, behind a profiled wall installed in said upper region in such a way that the circulation is inflected towards said annular region of the reactor, filtering means being placed at the inlet to the branch pipe.

10. Installation according to Claim 8, in which cooling means are fitted at least to the cylindrical partition of the reactor.

11. Installation according to Claim 8, in which heating means are fitted at least to the cylindrical partition of the reactor.